Control of Metabolic Processes; Edited by A. Cornish-Bowden and M. Luz Cardenas; Plenum Press; New York and London, 1990; xvi + 454 pages; $114.00

The contributors to this volume must feel that their work is not sufficiently appreciated. There is a considerable amount of special pleading as to how essential theory is, or has been, for the progress of biochemistry. It is, therefore, necessary to examine the contribution of the subject as a whole, as well as that of the specific topics presented at the NATO symposium in 1989. I have spent the last 40 years teaching kinetics and thermodynamics to biochemists and applied these disciplines to experimental studies on biochemical systems. I have, therefore, a vested interest in the question: can more attention to theory, by experimentalists, advance their subject more rapidly?

I suppose the organizer of a symposium is entitled to philosophize in an introduction, but 10 pages at $0.25/page is a bit much for personal recollections and a doubtful answer to the above question. I wonder how many readers will be interested in the fact that Cornish-Bowden did not realize in 1974 that transient kinetic equations can be applied to sequences of enzyme reactions, as well as to sequences within enzyme reactions. In my opinion the contribution of theory to biochemistry has come from the correct interpretation of data and not from the construction of hypothetical models, unless the latter suggests a specific experiment to be carried out by the author. As a journal editor I must have rejected scores of manuscripts containing pages of text book algebra, which did not fulfil this criterion. Unlike Cornish-Bowden, I think that, by the proliferation of such models, theoreticians have done a great deal of damage. Some theoretically minded biochemists are subject to the belief that the invention of a new term is equivalent to the discovery of a new phenomenon. The semantics of control theory, for instance, could be simplified with more reference to the terms in common use in standard law of mass action kinetics. In the study of enzyme mechanisms and of sequences of enzyme reactions, theory is essential, but good experiments are rarer than theoretical models.

Hypothetical models, as well as incorrect analysis of data often combine to muddy the waters of the biochemical literature. As a distinguished biochemist said about substrate chanelling in glycolysis 'it is an attractive theory but it is going to die hard'. The first three papers of section V are the perfect paradigm for what can go wrong with theoretical models and data analysis. The model has become so attractive that the experiments are designed to prove it rather than to test it. Students read about it in popular biochemical magazines and it gets into text books. It will take a long time to get the errors out of the literature and to show where this potentially interesting phenomenon really does occur.

Another danger of an *ab initio* theoretical approach to biological problems is a combination of a touch of vitalism, by those who know algebra but do not understand physical chemistry, and a misunderstanding of the theory of natural selection by those who think that we live in an ideal world. Like getting on top in private enterprise, one does not have to be as efficient as is theoretically possible, one only has to be more efficient than the next one.

Having expressed my own prejudices about theory in biochemistry I should say some more about the volume under review. Apart from the purely theoretical sections (sections I and II; 157 pages) there are four interesting papers on interconvertible enzymes in metabolic control. This is a subject which clearly is founded on good biochemical experiments and, subsequent, straight forward kinetic analysis. Section IV contains four more papers on theory 'applying control analysis to real systems', section V treats the dreaded channelling problem but has two interesting papers on chemical sensing and oscillations. The final section contains ten papers on experimental examples. It appears from contributions like those of Knowles et al. (R.G. not J.R.), as well as from comments by my own colleagues interested in metabolic control, that control theory has proved to be a valuable diagnostic for effects on very complex problems. This applies to situations when insufficient information or the inadequate size of the computer prevents a complete solution in terms of the differential equations describing the behaviour of every intermediate of the pathway.

The papers presented do not contain a lot of experimental evidence for the usefulness of control theory, they give opinions and references. I find it difficult to judge whether the theoretical papers provide enough introduction to teach the ignorant or convert the agnostic to the use of the methods described. My impression is that there is little in the volume which is not readily available in the literature and I would not want my departmental or University Library to spend $114 of its limited budget on this collection of papers.

H. Gutfreund

Isozymes: Structure, Function and Use in Biology and Medicine; Edited by Z.-I. Ogita and C.L. Markert; Wiley-Liss; New York, 1990; xxvi + 973 pages; $250.00

This book contains 45 articles drawn from papers presented at the Sixth International Congress on Isozymes held in Toyama, Japan on May 29-June 2, 1989. The contributions are grouped under the headings Molecular Biology, Fisheries Biology, Physiological Significance, Development and Differentiation, Plant and Animal Breeding, Genetics and Evolution, Medical Uses, and Enzyme Modification and Isoproteins. This breadth of topics serves to emphasise the importance of the study of isozymes in many diverse areas of biology as well as the continuing fascination of these systems as objects of study in their own right.

The standard of production of the volume is very high with

none of the defects so often found with published conference proceedings. It also has a comprehensive index. The editors are to be congratulated on both these counts.

Coverage of the various sub-topics listed above is somewhat unequal with more emphasis on molecular biology, genetics, development and differentiation than on 'traditional' areas such as medical applications — but this is perhaps a fair reflection of the current emphasis in isozyme research. There is no doubt that isozyme systems have proved themselves as valuable tools for study of gene regulation and cellular differentiation, and this book provides a very good overview of achievements and prospects in these areas.

As might be expected the contributions are of two broadly different kinds. Some authors (the minority) give largely historical surveys of their subjects with little or no new material. These chapters are, in the main, well-written and will be of interest to the specialist in other areas of isozyme research who want to know what is going on elsewhere. The majority of the chapters on the other hand, report significant new experimental results and some authors, freed from the shackles usually imposed by referees of articles for the primary literature, indulge in interesting and useful speculation as to what their results might mean. It is one of the strengths of the volume that authors have been given the space (30 pages or more in some cases) to develop their ideas as well as to present new material.

In an introductory chapter Markert signals the development of a whole new direction in isozyme research provided by transgenic animals. Clearly the possibility now exists to create new systems by insertion of foreign genes into host chromosomes thus providing novel objects for physiological and developmental studies. Whether the use of the term isozyme is appropriate for such foreign proteins is debatable but the potential of the technology cannot be in doubt.

In summary, this is a book to which all 'isozymologists', as well as scientists working in related disciplines, will want to have access to. They should certainly put it on their library acquisition list since, unfortunately, most pockets will not be sufficiently deep to run to a personal copy.

S. Doonan

Cytochrome P-450 and Active Oxygen; By A.I. Archakov and G.I. Bachmanova; Taylor & Francis; Basingstoke, 1990; vi + 339 pages; £55.00

In view of the vast subject area, this represents an excellent reference book for anyone who wishes to remain up-to-date on the progress of current research into the cytochromes P-450 enzyme superfamily. It also provides a fascinating insight into the areas of cytochrome P450 research in the Soviet Union, much of which has hitherto remained virtually inaccessible to the western world. But this book is much more than that: it is a treatise on all of the important aspects of this fascinating and ubiquitous enzyme. The current status of cytochrome P-450 research is painstakingly recorded and categorized in a rational way which leads the reader through all the major facets of this exciting and rapidly developing field, which is of fundamental importance to those seriously interested in chemical metabolism and its regulation. Due to the expanding nature of cytochrome P-450 research, with more publications per annum than any other topic in science, it is essential that a major monograph on the latest developments is produced every few years. This book continues the already established sequence comprising the previous works on the subject by Sato and Omura (1978), Ruckpaul and Rein (1984) and Ortiz de Montellano (1986). As such, this publication is strongly recommended reading for all cytochrome P-450 specialists.

The book is subdivided into eleven chapters covering such aspects of the subject matter as the mechanisms of oxygen activation, genetic engineering, toxicity, induction, regulation, reconstituted systems, molecular organization and membrane topology, catalytic activity, physical properties and characteristics, and the isolation and purification of the various cytochromes P-450 from different biological sources. The text is well-written, though occasionally loses something in translation. It is unfortunate, however, that the new nomenclature of cytochrome P-450 proteins is not employed and one feels that a larger number of illustrative figures and tables would have enhanced the presentation of the considerable factual information. In conclusion, this monograph contains an extremely thorough and detailed treatment of the major aspects of cytochrome P-450 research both in breadth and depth, bringing together many apparently isolated pieces of information in such a way as to convey logically connected conceptual sequences which build into an integrated structure with great lucidity and clarity. This is a timely work of great importance written by two world experts in the field.

D.F.V. Lewis

Advanced Immunochemistry (Second Edition); By Eugene D. Day, Wiley-Liss; New York, 1990; xxiii + 693 pages; $120.00 (hardback) $59.50 (softback)

This is a monumental book: approximately 700 pages long with over 2000 references. The first edition (1972) was only about 450 pages in length and the increase in size underestimates the growth of the field in the intervening years.

The book is divided into two parts. Part 1 (Structure of